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Two studies were carried out to measure the difficulties in visual perception which affect the reading abilities of disadvantaged children. The first study involved children in the first grades of eight poverty-area schools. Results reinforced earlier findings that urban disadvantaged children scored poorly on tests of visual perception. Perceptual training programs did not appear to have much positive effect. A second study using high school students found that visual perception and intelligence test scores were highly correlated, indicating overlap of behavior tapped. Results of these and other studies led to the conclusions that, since correlations existed between visual perception and intelligence test measures, visual perception training might raise intelligence test scores but not necessarily reading scores. Also, while some children need perceptual training, this should not be substituted for reading readiness measures and methods. References are included. (MD)

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STUDIES IN VISUAL PERCEPTION AND READING IN DISADVANTAGED CHILDREN

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INTRODUCTION

Over a decade ago Pasamanick and Knobloch (11) demonstrated that disadvantaged populations manifest severe visual perceptual deficits. What they called "organic factors" is simply an etiological term that is less defensible than the report of the perceptual deficits they found in the populations studied. As far back as Passow's first book on education in urban ghettoes, Deutsch refers to the perceptual deficits in both visual and auditory channels that he found in New York City's black and Puerto Rican children. (4) Since then, the literature makes the point clearly enough: As a group, disadvantaged, urban low SES children manifest a disproportionately high incidence of visual perception dysfunctions.

Our own more recent studies reinforce these earlier findings. Until recently the severity and quantity of the visual perception problems have appeared to us to be so formidable that we wondered why any of these disadvantaged children could learn to read and write, which more than a few seem to be able to do. More recently, however, our wonder has ceased. As a result of asking two questions of our own research, we have lately begun to wonder why we ever wondered about it in the first place. The two questions we asked were:

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1. What behaviors are we really tapping in these tests of visual perception?
2. Given the high incidence of visual perception dysfunctions, what are the practical implications for reading instruction? In other words, so what?

This paper summarizes our own findings about perceptual dysfunctions in urban disadvantaged children and youth and then discusses the tentative answers we as reading specialists have made to these questions.

SUMMARY OF STUDIES

Definitions: In all our studies, the term "visual perception deficit" or "dysfunction" describes malfunctions in the visual information processing system because of organic impairment, developmental lag, lack of learning or genetic inheritance. Regardless of the apoplexy this causes in some conscientious researchers into differential diagnosis--a legitimate, perhaps even fruitful pursuit for them--we have found it convenient for our purposes to group the Frostig types, the Money types, the Rabinovitch types, the Getman types, the Kephart types and even the Delacarto types into one group. Our purposes consist of behavioral diagnoses for pedagogical treatment. Or to put it bluntly, we're in the teaching reading business, and eventually they all end up in our laps, label or no label. We do limit the category to problems of central processing rather than peripheral malfunctions ("eye sight") although we occasionally consider the latter a manifestation of the former. We also associate the supporting information processing modes (motor, tactual, auditory) with visual perception. Of course when we get to the nitty gritty of remediation, we forget the label because it has no relevancy to treatment.

Finally, the definition of visual perception in our statistical and clinical studies boils down to the measuring tool we use. For example, in the first study described, visual perception is

what we measure on the Frostig test. In the second study it is an original battery based on a developmental vision theory.

The First Grade Study: In 1964 we gave clinical exams using a Keystone Telebinocular Survey, visual motor checklist and some standard, simple neurological tests of body awareness, finger gnossis, etc. to 15 second graders. As far as we could tell, these children were typical of the low achievers in an urban school district. At that time the severity of dysfunctions astounded us. Today we are not so easily astounded. For example, a child was seated and soothed into comfort before an examiner. The examiner placed a beam of light about one foot from the subject's nose and asked the subject to fixate. He was reminded again to keep looking at the light. Ten children were so examined. The longest fixation time was nine seconds. The median fixation time for ten subjects was slightly more than four and a half seconds. The first four subjects examined for kinesthetic awareness of body parts were unable to move their left legs in a standing position without resorting to postural distortions similar to spasticity.

As a result of such observations, we surveyed for the incidence of perceptual dysfunctions in eight schools offering a representative sample of socially disadvantaged first graders on New York's Lower East Side. A detailed report of that study is available elsewhere. (1)

At that time the public school population on the Lower East Side of New York City was about 55% Puerto Rican, 19% black and 26% white and Chinese. Most of the black and Puerto Rican children were from low SES families. Our own studies showed that in grade 3.5, 90% of the Puerto Ricans, 81% of the blacks and 45% of the white and "others" were already scoring below grade level in reading. By grade 8.5, 65% of the Puerto Ricans, 33% of the blacks and 14% of the whites were three or more years retarded in reading. (1)

The Frostig Developmental test of Visual Perception (DTVP) was administered by trained and experienced clinicians to 120 first graders randomly selected from eight elementary schools in this district. Since the survey was done in April, the average age of the children was 6.6 years. We would expect, obviously, a 6.6 average perceptual age. This simply means that a 6.6 year older

should perceive like a 6.6 year older which would yield a perceptual quotient (PQ) of 100.

Table A shows means, standard deviations and ranges on each of the DTVP subtests for the total population.

Table A

Mean, S.D., Range of the Perceptual Age Level Scores of Sample First Graders (CA=6.6)

N=119

Subtest	Mean	S.D.	Minimum	Maximum
I. Eye-Motor Coordin.	5.97	2.51	1.00	9.60
II. Figure Ground	6.12	1.43	3.00	8.30
III. Shape Constancy	5.44	1.56	2.60	9.00
IV. Position in Space	6.02	1.23	3.30	8.90
V. Spatial Relations	6.29	1.23	0.00	8.30

Table A shows a wide range of perceptual ages. In fact, PQ's ranged from 67 to 126. In terms of curve distribution, about 40% of the population in grade one was about two-and-a-half years retarded on the DTVP. The mean PQ for the group was 95.87 with a standard deviation of 13.22.

Analyzing the population by sex in Table B we see differences among males and females, none of which are statistically significant. Minimum scores for females were not quite as low as for males. Maximum scores represent test ceilings inherent in the test. Generally speaking, lowest scores tend/ed to be earned by males but, in general, boys had slightly higher PQ's than girls. While differences were not statistically significant, this trend of males scoring slightly higher PQ's than females was consistent in all tables.

Table B

PQ's Of Sample First Graders Compared By Sex

Sex	Mean	S.D.	Min. PQ	Max. PQ
Males N=67	96.87	13.69	67.00	126.00
Females N=52	94.58	12.62	73.00	121.00

Comparing age level scores for each perceptual subskill and PQ's according to ethnicity, we see striking differences across ethnic groups. Tables C and D compare scores for four ethnic groups. The sample white and Chinese populations, while accurate ratios of the total population from which the sample was drawn, are too small to be statistically significant. However, we suspect they are accurate in demonstrating superiority of these subgroups in visual perception development, for this is consistent with other cognitive measurements and with clinical observations of the populations.

Table C reveals shockingly lower PQ's among Puerto Rican (PR) and black (B) children compared to white (W) and Chinese (Ch). The curve for PR and B compared to W and Ch shows a much higher incidence of severe perceptual dysfunctions.

Table D gives us a finer analysis showing, for example, that all groups are retarded in Eye-Motor Coordination (Subtest I) 80% of the way through grade one. Blacks appear to score almost to grade level, but Puerto Ricans, whites and Chinese are approximately a year retarded in Eye-Motor Coordination. This is the only case of members of the two lowest SES subcultures (PR and B) surpassing whites and Chinese in this survey. It should be noted that the inherent test ceiling prevents discriminating among groups at the high end of the curve. This increases the significance of the low scores.

Table D indicates that PR's are higher in Figure Ground Perception (Subtest II) than are white pupils. This difference, however, did not reach statistical significance. In every other subtest the trend is reversed with W and Ch scores exceeding PR and B scores to a significant degree.

Table C

PQ's Of Sample First Graders Compared by Ethnicity

Ethnic Group	N	Mean	S.D.	Minim. PQ	Maxim. PQ
Puerto Rican	65	95.26	12.59	70	119
Black	39	92.56	12.35	67	118
White	9	103.44	11.88	82	121
Chinese	6	112.50	13.63	93	126

Table D

Mean, S.D., Minimum and Maximum Perceptual Age Level Scores of Sample First Graders Compared by Ethnicity*

Subtest	Ethnic Group	Mean	S.D.	Minim.	Maxim.
I Eye-Motor	PR	5.96	2.56	1.00	9.60
	B	6.20	2.15	1.00	9.60
	W	5.32	2.91	1.00	9.60
	Ch	5.58	3.75	1.00	9.60
II Figure-Ground	PR	6.18	1.41	3.00	8.30
	B	5.78	1.29	3.90	8.30
	W	6.08	1.51	4.00	8.30
	Ch	7.63	1.63	4.30	8.30
III Shape-Constancy	PR	5.19	1.41	2.60	8.30
	B	5.27	1.47	3.00	9.00
	W	6.71	1.59	4.00	9.00
	Ch	7.25	1.84	4.00	9.00
IV Spatial Position	PR	6.00	1.21	3.30	8.90
	B	5.71	.92	4.00	7.00
	W	7.04	1.23	5.00	8.90
	Ch	6.62	1.38	4.90	8.90
V Spatial Relations	PR	6.34	1.30	0.00	8.30
	B	5.83	1.00	4.00	8.30
	W	6.89	.94	6.00	8.30
	Ch	7.83	.36	7.60	8.30

*Puerto Rican (PR) N=65; black (B) N=39; white (W) N=9
Chinese (Ch) N=6

Lowest scores for PR and B are in Shape Constancy (Subtest III). In other subtests where minimum scores vary among ethnic groups, PR scores are lowest with B scores second lowest. In Shape Constancy not a single PR was able to score at maximum in spite of a sample population three fifths larger than B, seven times larger than W, and almost eleven times larger than Ch. In other words, in a test that has low ceilings, out of 65 Puerto Rican children, not a single one was able to "max" the test, while at least one out of six Chinese, one out of nine white and at least one out of 39 black children did earn a top score.

This first grade study merely established what we already knew--that urban disadvantaged children were poor on tests of visual perception. A number of subsequent studies followed which involved perceptual training programs as preventitive and or remedial treatments. One such study is reported elsewhere. (2)

In general, we did not see significant changes in reading achievement as a result of these perceptual training programs. Nor did we (on retrospect) expect to. Our findings were essentially the same as Jacob's report of his results using the Frostig Visual-Perceptual Training Program--no real gains in reading. (6)

Secondary School Study: So we turned our efforts to the question, What is visual perception as we measure it. Our hunch was that visual perception is really one of the major components of intelligence as measured in IQ tests. That hunch was based on a behavioral analysis of IQ tests, perception tests such as the Frostig and on the findings in such studies as Lyons and Lyons (8), Olson (10) and others (7),(12). These studies found higher correlations between measurements of visual perception and IQ on such tests as the Primary Mental Abilities battery and the California Test of Mental Maturity. Looking at the items on tests of both independent and dependent variables revealed that at least on inspection, they were tapping the same behaviors.

For a study of visual perception in junior high age children, we constructed our own test of visual perception made up of four subtests. These included a task requiring the processing of a tactual input into a visual motor output (drawing figures that are felt but not seen); a test of binocular coordination while trying to follow a visual target (Brock String Test); a test of visual-

kinesthetic flexibility (upsetting the learned hand-eye relation and scoring the rate and quality of new learning); a test of processing visual input into visual motor output (an adaptation of the Benton Visual Retention Test). The battery was developed according to a theory of basic visual perception similar to the Getman or Kephart theories (5) and was validated and cross validated on clinical cases evaluated by developmental vision optometrists trained under the Optometric Extension Program.

The battery along with the Primary Mental Abilities tests and the Iowa Tests of Basic Skills was administered to 352 disadvantaged urban seventh and eighth graders. In summary, the study used multiple and partial correlations and found very little relationship between the perception battery and reading achievement. However, much of what was measured on the perception battery apparently overlapped with the Primary Mental Abilities Test supporting our hunch that these types of visual perception tests were related to the types of demands made by "non verbal" IQ tests. The PMA has a number of"non verbal"subtests.

Clinical Studies: An analysis of 65 clinic cases comparing the learning disability patterns of middle class children with disadvantaged urban children of a variety of ages and ethnic groups revealed no difference in the incidence of perceptual dysfunctions among lower class disabled readers compared to middle class disaabled readers. (3) In this study visual perception was defined as the behaviors measured on the Keystone Survey, Benton Visual Retention Test, performance subtests of the Wechsler Intelligence Scale for Children (WISC), Draw-A-Man or the Gesell Incomplete Man test and clinical observation. In this study it appeared that perceptual deficits are related to the disability syndrome more than to the SES difference or to subcultural differences. Furthermore, the clinic records did not show any differences in the treatment success rate between retarded reading children with perceptual deficits and those without. Most of them learned to read in the clinic.

Letter Reversals Study: We have just completed a doctoral dissertation (9) that indicates that spatial orientation of letter-like nonsense figures (Gibson's letter equivalent forms) in

sequences yield a .66 point biserial correlation. The second graders in this study were asked to match series of these nonsense shapes with a stimulus series. When the same task was demanded for single shapes rather than a series, the correlation still held above .40. Scores on the easier one-shape task were combined with scores on the test of reversals of shapes in sequences yielding a correlation of .70. The research design controlled for factors of discrimination and memory. The full report of this study will be available in the near future and should be considered in relation to the great confusions and debates about reversals, laterality, dominance, etc.

CONCLUSIONS

What do these studies suggest? It is not surprising to find urban disadvantaged children low in visual perception. In effect by definition they must be low, for if the term "disadvantaged" has any meaning at all, it means that a comglomerate of environmental conditions, especially racism and poverty, and perhaps heredity in a dynamic relationship conspire to shove the ghetto child down. As a group we would expect low SES children to be low in almost all variables of cognition and school related tasks.

But the first two studies cited also suggest that tests of visual perception are tapping behaviors that by accident or intent were used to construct IQ tests. Two implications follow. First, one ought not to expect tests of visal perception as described in this paper and related training programs to either predict or effect reading scores to any significant degree. In fact, this writer is, frankly, resentful of professionals who make claims about visual perception and reading based on correlations .4 or below which are usually insignificant in a practical sense. The perception factors may be more relevant to IQ, but this does not automatically lead to reading achievement scores.

Secondly, if someone is interested in raising IQ scores, he might consider visual perception training amongst other things. In raising such scores, however, changes in more practical areas of literacy, for example, will not automatically follow.

In other words, what behaviors are we really measuring when we play with the types of visual perceptual instruments described in these studies? The answer seems to be, behaviors that relate somewhat to the demands of non verbal IQ tests.

So what? The study of clinic cases and most of the curriculum studies of reading methods that we have done suggest that we do not need to teach most of these visual-perceptual-motor behaviors in order to teach disadvantaged underachievers to read. The last study indicates that, perhaps, we should pay attention to the spatial orientation of letters both in isolation and in sequences. The value of the first two studies for me personally was to establish that visual perception of the kind suggested in the measurements used in those researches is a waste of time for someone like me in the reading business. The third group of studies seems to be telling me to teach children to read not to crawl or to cross pattern or to draw triangles. The last study suggests that not dominance or laterality or even spatial orientation in general, but letters and words are the important factors, for I have seen no studies of orientation of non-letter stimuli that generate correlations of .66 and .70 as in this study.

Obviously, very extreme cases of dysfunctioning children will need some perceptual work just to get them behind a desk and on to a page. But even in these relatively rare cases, professionals should be ultraconservative in their prognoses. In predicting results they should stick to the perceptual behaviors and make no claims for reading success. I would also caution researchers to avoid visual perception tests of the kind described in this paper as substitutes for reading readiness measurements.

To put it succinctly, on the basis of present data, I would play the visual perceptual game if I were in the visual perception or the IQ business. But in the reading field, the surest way to get urban ghetto kids to read is to teach them letters and words and to do it thoroughly.

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